

ATTACHMENT - SPECIFICATION AMENDMENTS

Please replace the paragraph at page 2, line 3 through page 3, line 2 with the following amended paragraph:

Furthermore, punching tools with releasable locking against relative rotating movements between the punching die and the die plunger are known from U.S. Patent ~~No. Patents Nos.~~ 2,172,272 and ~~German Utility Model 92 18 677~~ 5,131,303. Such locking to prevent movements in both directions of rotation is necessary because the punching die is connected with the die plunger by a screw thread, which transmits the axial loads occurring during punching from the punching die to the die plunger and permits a compensation of the total length of the punching die and the die plunger after re-grinding. To prevent a relative rotating movement of the two threaded elements, and therefore a change of the total length, the exterior thread is cut by several axial longitudinal grooves distributed over the circumference, and a pointed pin, seated in a transverse bore of the screw thread element with the interior screw thread, is pushed into one of the longitudinal grooves by a spring washer. ~~In the mentioned utility model~~ U.S. Patent No. 5,131,303, the pointed pin is embodied as one piece with ~~the spring~~ a spring washer and is prevented from a radial backing movement out of the longitudinal groove in that the bore wall of the guide bushing blocks a widening of the spring washer. Basically the locking must absorb the loads in both directions of rotation. If the spring washer is outside of the bore in the guide bushing, a relative rotation of the screw thread elements is possible, wherein it is necessary for releasing and renewed connecting of the punching die with the die plunger to overcome the ~~rotatory~~ rotary locking several times in the course of each revolution.

Please replace the paragraphs at page 3, lines 4 through page 5, line 2 with the following amended paragraphs:

The object of the invention is based on creating a punching tool of the type described which provides secure locking by means of holding members against axial relative movements between the punching die and the die plunger, which permits a simple and rapid separation of the punching die from the die plunger, and wherein the large forces occurring in the course of the punching stroke are kept away from the holding members ~~by a one-sided relief of the locking.~~

The above object is attained in accordance with the present invention in that during the punching stroke the punching die rests against a front face of the die plunger and can be axially fixed in place by means of one or several holding members in the form of snap-in balls, each of which is seated in a transverse bore in the front end of the plunger, and which are maintained in engagement with the annular groove by means of ~~a spring washer~~ resilient ring whose outer diameter is less in the engagement position than the inner diameter of the guide bushing and which can be widened to a diameter greater than the inner diameter of the guide bushing when the punching die is removed from the die plunger.

The novel punching tool initially offers the advantage that the strong loads during the punching stroke are transmitted via the front face of the die plunger, so that the holding members need not be correspondingly strong. The snap-in balls and their guide faces are only stressed by the considerably lesser forces during the return stroke of the punching die. ~~The spring washer~~ resilient ring also needs to exert only a minimal spring force on the snap-in balls in order to prevent the punching die from falling out of the

bore in the die plunger outside of the guide bushing. Therefore the punching die can be easily separated from the die plunger or, vice versa, pushed into the bore in the front end of the die plunger and locked there. Regardless of the small or minimal spring force with which the ~~spring washer~~ resilient ring pushes the snap-in balls into the annular groove, the proposed locking against axial separation of the punching die from the die plunger is absolutely dependable as long as it is provided by means of a suitable selection of the diameters that the snap-in balls still engage the annular groove when the ~~spring washer~~ resilient ring rests against the bore wall of the guide bushing.

To keep axial play in the locking as low as possible, it is provided in a preferred embodiment of the invention that in the engaged position the outer diameter of the ~~spring washer~~ resilient ring is only minimally less than the inner diameter of the guide bushing.

Also, in view of dependability of the locking, the ~~spring washer~~ resilient ring is usefully made of steel. It has furthermore been shown to be advantageous if the ~~spring washer~~ resilient ring is seated in an annular groove in the circumferential surface of the die plunger which crosses the center longitudinal axes of the transverse bores and is only slightly wider than the diameter of the ~~spring washer~~ resilient ring in axial section.

Please replace the paragraph at page 7, lines 10-21 with the following amended paragraph (previously amended September 23, 2010):

The guide bushing 10 can be a conventional guide bushing such as is used, for example, in connection with a conventional punching press. The guide bushing 10 is inserted into the tool receiver of the punching press in an angle of rotation positioned in relation to its central longitudinal axis, which is for example determined by an exterior

longitudinal groove in the guide bushing, and is fixed in this position. It is not important for the present invention how the upper end of the guide bushing is connected with the other components of the punching tool and ~~whether an~~ tool. An exchangeable stripper plate ~~is~~ may be attached to the lower end as represented by dotted lines S in Figure 1. In the exemplary embodiment shown, for the sake of simplicity the portion of the punching tool used as a stripper is shown as being of one piece with the guide bushing 10.

Please replace the paragraphs at page 9, line 14 through page 12, line 2 with the following amended paragraphs (previously amended January 23, 2006):

In the course of inserting the punching die 22 in the bore 18, three snap-in balls 32, each of which is seated in a transverse bore 30 in the front end of the die plunger 12, snap into an annular groove 34 in the rear of shaft 20 of the punching die 22 immediately prior to reaching the axial end position in which the rear of the collar 26 rests against the front end face of the die plunger 12. The snap-in balls 32 are urged radially inward by ~~an elastic washer~~ a resilient ring 36 made of steel or other elastic material, which surrounds them but, because of a slight inward taper of the transverse bores 30 in the area of their outlet into the bore 18, they are prevented from falling out of the transverse bores 30 after the punching die 22 has been pulled out of the bore 18 of the die plunger 12. The axial position of the transverse bores 30, whose diameter matches the diameter of the snap-in balls 32, in relation to the front end face of the die plunger 12, and the axial position of the annular groove 34 in relation to the rear face of the collar 26, have been selected to be such that in the assembled state represented in the figures the collar 26 rests ~~again~~ against the front end face of the die plunger 12,

and at the same time the snap-in balls 32 enter as far as possible into the annular groove 34. In this position the ~~elastic washer~~ resilient ring 36 takes up a substantially concentric position with respect to the punching die 22 between the snap-in balls 32 and the bore wall of the guide bushing 10. In this case the radial distance between the ~~elastic washer~~ resilient ring 36 and the bore wall should be as short as possible in order to minimize a radial deflection movement of the snap-in balls 32 and a corresponding axial movement of the punching die 22 with respect to the die plunger 12 during the transition from the punching stroke to the return stroke. The ~~elastic washer~~ resilient ring 36 is seated in an annular groove 38, the width of which matches its height, in the die plunger 12, whose central plane coincides with the transverse plane in which the central longitudinal axes of the transverse bores 30 are located. The ~~elastic washer~~ resilient ring 36 is preferably a spiral spring ~~washer~~ having several turns, as best shown in isolation in Figure 3.

As long as the front end of the die plunger 12 is located in the guide bushing 10, the punching die 22 is maintained unreleasably in the bore 18 by the snap-in balls 32. The balls 32 cannot radially exit the annular groove 34, because they would have to widen the ~~elastic washer~~ resilient ring 36 beyond the limits of its radial expansion to do this. But the ~~elastic washer~~ resilient ring 36 can only be minimally widened until it engages the bore wall of the guide bushing 10. Thus, in the assembled state the fastening arrangement shown and described here represents an absolutely dependable, positive locking, which is relieved at one end, so that large punching forces can also be transmitted.

On the other hand, the described fastening arrangement permits a very rapid and simple removal and exchange of one punching die 22 for another. As soon as the front end of the die plunger 12 ~~has been removed from~~ moved downwardly out of the front end of the guide bushing 10, the ~~elastic washer 26~~ resilient ring 36 maintaining the snap-in balls 32 in their inner end position can easily be deflected radially outward when the punching die 22 is pulled out of the front end of the bore 18 by a manual pull and in the process the snap-in balls 32 are radially urged out of the annular groove 34. In the process the ~~elastic washer~~ resilient ring 36 maintains the snap-in balls 32 in their transverse bores 30 and, following the removal of the punching die 22, urges them into their radially inner end position ~~in~~ against the tapered inner ~~outlet~~ opening of the transverse bores 30. Also, during insertion of a new punching die 22 into the bore 18 outside of the guide bushing 10, the snap-in balls 32 can initially be deflected radially outward while the ~~elastic washer~~ resilient ring 36 is widened, before they snap into the annular groove 34 directly ahead of reaching the represented end position, in the course of which the diameter of the ~~elastic washer~~ resilient ring 36 is reduced until it again fits into the bore of the guide bushing 10.